



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/825,800	04/14/2004	Darrin Leonhardt	N.C. 95,876	1602
26384 7590 01/10/2007 NAVAL RESEARCH LABORATORY ASSOCIATE COUNSEL (PATENTS) CODE 1008.2 4555 OVERLOOK AVENUE, S.W. WASHINGTON, DC 20375-5320			EXAMINER MCDONALD, RODNEY GLENN	
			ART UNIT 1753	PAPER NUMBER
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		01/10/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/825,800

Applicant(s)

LEONHARDT ET AL.

Examiner

Rodney G. McDonald

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 October 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

Claims 1-36 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Specifically, Applicant has narrowed the claim to say "consisting of" which Applicant states excludes the use of a magnetic field. Applicant's specification requires that where there is "a separation between the plasma sheet and the substrate" a magnetic field is required. This is shown in Fig. 1 for example. In embodiments where the electron plasma sheet is directed at the substrate no magnetic field is required but in this case there is no separation between the plasma sheet and the substrate. This is specifically shown in Fig. 4 for example. As such Applicant's current claims appear to support the case of Fig. 1 where a magnetic field is required and excluding such a magnetic field would constitute new matter.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

Art Unit: 1753

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

1. Claims 1-7 and 19-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over ***Theoretical overview of the large-area plasma processing system (LAPPS)*** by Manheimer et al. (Manheimer) in view of Collins et al. (U.S. Pat. 4,509,451).

2. For claim 1, Applicant requires a large area metallization pretreatment and surface activation system consisting essentially of a gas or gas mixture; an electron beam source; a low electron plasma of pre-determined width, length, thickness, and location relative to a surface, wherein the plasma sheet is produced by the electrode beam passing through the gas or gas mixture; a substrate to be treated; wherein the radical and ion flux from the plasma is controlled to chemically and physically alter the surface of the substrate thereby improving the ability of a film to adhere to the substrate; wherein the radical and ion flux from the plasma is controlled by selecting an appropriate gas mixture based on the desired surface pretreatment and by altering the separation between the plasma sheet and the substrate.

3. For claim 19, Applicant requires a method of producing a chemically active surface to improve the ability of a film to adhere to a substrate, consisting essentially of the steps of producing a low electron plasma of pre-determined width, length, thickness,

Art Unit: 1753

and location relative to a surface by passing an electron beam through a gas or gas mixture; and controlling the radical and ion flux from the plasma to chemically and physically alter the surface of a substrate thereby improving the ability of a film to adhere to the substrate; wherein the radical and ion flux from the plasma is controlled by selecting an appropriate gas mixture based on the desired surface pretreatment and by altering the separation between the plasma and the substrate.

4. Manheimer discloses a LAPPS system comprising a sheet electron beam (abstract), gas for a plasma (abstract), formed plasma (abstract), and substrate (abstract). The surface of the substrate is altered by the radical and ion flux and are controlled based upon the desired pretreatment (abstract).

5. For claims 2 and 20, Applicant requires the width to be much larger than the thickness of the beam. The beam is a sheet beam and inherently larger in width than thickness (abstract).

6. For claims 3 and 21, Applicant requires confining the electron beam. Manheimer discloses applying a longitudinal magnetic field (pg. 372).

7. For claims 4 and 22, Applicant requires the position of the beam, plasma and substrate to be adjustable. Because the substrate can be rotated or moved on a continuous feed belt (pg. 372), it is adjustable.

8. For claims 5 and 23, Applicant requires the substrate to be electrically biased. A DC bias is applied to the substrate (pg. 371).

9. For claims 6 and 24, Applicant requires the gas to comprise at least one molecular gas. Manheimer uses oxygen (pg. 371).

Art Unit: 1753

For claims 7 and 25, Applicant requires roll-to-roll spools to feed the substrate.

Manheimer uses a continuous feed belt (pg. 372) and hence discloses the limitations.

10. The difference between Manheimer et al. and the present claims is the exclusion of a magnetic field.

11. Manheimer et al. recognize that LAPPS has the disadvantage of requiring a magnetic field to confine the beam and that the magnetic field has little effect on ion transport in the LAPPS. Manheimer et al. recognize a need for beams without this disadvantage. (See Manheimer et al. page 383) Collins et al. teach an electron beam for producing a sheet plasma for treating the substrate. (Column 2 lines 29-68; Column 3 lines 1-32; Column 3 lines 58-63)

12. The motivation for utilizing an electron beam for producing a sheet plasma without a magnetic field is that it allows for creating uniform plasmas with little substrate radiation damage. (Column 1 lines 58-68; Column 2 line 1)

13. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Manheimer et al. by utilizing an electron beam to produce a sheet plasma without a magnetic field as taught by Collins et al. because it allows for creating uniform plasmas with little substrate radiation damage.

14. Claims 8-14, 16-18, 26-32, and 34-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Manheimer et al. in view of Collins et al. as applied to claims 1-7 and 19-25 above, and further in view of Hamada (U.S. Pat. 5,089,066).

Art Unit: 1753

15. For claims 8 and 26, Applicant requires providing a second gas and a target wherein the plasma is used with the second gas to sputter material from the target and deposit as a thin film onto the substrate.

16. For claims 14 and 32, Applicant requires conventional plasma vapor depositing onto the substrate with the material generated by sputtering means or vaporization means.

17. Manheimer is described above, but does not disclose depositing a layer onto the pretreated substrate. Manheimer does, however, indicate that the pretreatment is to be used before conventional plasma processing such as etching or deposition (pg. 370).

18. Hamada discloses various deposition techniques that can be used after a substrate is pretreated include sputtering, CVD, or other deposition techniques. The sputtering involves providing a sputtering target that is biased and sputtering in an argon gas (col. 6, l. 57-68).

19. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Manheimer to utilize sputtering or CVD as deposition techniques after the plasma pretreatment because of the knowledge that such deposition techniques are conventional after pretreatment.

20. For claims 9 and 27, Applicant requires the target to be biased above a sputtering threshold. The limitation is inherent in Hamada because otherwise, the target could not be sputtered and emit atoms.

21. For claims 10, 17, 28, and 35, Applicant requires the electron beam and plasma to be located between the target and substrate. The limitations are inherent because if

Art Unit: 1753

the plasma were above the target or under the substrate, there could be no deposition.

Regarding the electron beam, if it were not between the target and substrate, then the target or substrate would block its path to the substrate.

22. For claims 11, 18, 29, and 36, Applicant requires the position of the beam, plasma, target, and substrate to be adjustable. Because the substrate moves on a roll to roll system, it is adjustable.

23. For claims 12 and 30, Applicant requires the second gas to be atomic or molecular or a mixture. Argon is used in Hamada and hence, the limitation is met.

24. For claims 13 and 31, Applicant requires a roll-to-roll spool to feed the substrate. As noted above, Manheimer discloses the limitation.

25. For claims 16 and 34, Applicant requires the vaporization means to be electron beams, lasers or thermal sources. Hamada discloses using an electron gun or resistance heating to deposit (col. 7, l. 1-20).

26. Claims 15 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Manheimer et al. in view of Collins et al. and further in view of Hamada as applied to claims 1-14, 16-32 and 34-36 above, and further in view of Barnes et al. (U.S. Pat. 5,178,739).

27. For claims 15 and 33, Applicant requires the sputtering means to be magnetrons or ion beams.

28. Manheimer in view of Collins and further in view of Hamada is described above, but the sputtering means being magnetrons is not described.

Art Unit: 1753

29. Barnes discloses that when sputtering, it is beneficial to have magnets behind the sputtering target, hence magnetrons, for the purpose of increasing sputtering rate and plasma density (col. 4, l. 16-25).

30. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the invention of Manheimer in view of Collins and further in view of Hamada to utilize magnetrons behind the target because of the desire to increase the sputtering rate.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

31. Claims 8-13 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-15 of copending Application No. 10/644,567 in view of ***Theoretical overview of the large-***

Art Unit: 1753

area plasma processing system (LAPPS) by Manheimer et al. (Manheimer) and Collins et al. (U.S. Pat. 4,509,451).

Claims 1-15 of '567 teach the Applicant's required sputtering system. (See Claims 1-15)

The difference between claims 1-15 of '567 is that utilizing the apparatus for pretreatment is not discussed and excluding the magnetic field is not discussed.

Manheimer et al. discussed above teach the use of such a system for pretreatment. (See Manheimer et al. discussed above)

32. Manheimer et al. recognize that LAPPS has the disadvantage of requiring a magnetic field to confine the beam and that the magnetic field has little effect on ion transport in the LAPPS. Manheimer et al. recognize a need for beams without this disadvantage. (See Manheimer et al. page 383) Collins et al. teach an electron beam for producing a sheet plasma for treating the substrate. (Column 2 lines 29-68; Column 3 lines 1-32; Column 3 lines 58-63)

33. The motivation for utilizing an electron beam for producing a sheet plasma without a magnetic field is that it allows for creating uniform plasmas with little substrate radiation damage. (Column 1 lines 58-68; Column 2 line 1)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified 10/644,567 by incorporating the pretreatment features of Manheimer et al. and to have utilized the features of Collins et al. because it allows for large area plasma processing and for creating uniform plasmas with little substrate radiation damage.

This is a provisional obviousness-type double patenting rejection.

Response to Arguments

Applicant's arguments filed October 23, 2006 have been fully considered but they are not persuasive.

In response to the argument that Manheimer et al. is a theoretical discussion, it is argued that Manheimer's teaching shows a system in Figure 1 capable of controlling the ion and free radical bombardment of a substrate in a large area. Such treatment could include pretreatment before conventional plasma processing such as etching. Clearly the system of Figure 1 is not a theoretical system and has been utilized by Manheimer to suggest Applicant's system. (See Manheimer discussed above)

In response to the argument that Manheimer et al. require a magnetic field, it is argued that Collins et al. is cited to show the exclusion of a magnetic field for producing a sheet plasma. Manheimer et al. recognize that LAPPS has the disadvantage of requiring a magnetic field to confine the beam and the magnetic field has little effect on ion transport in the LAPPS. Manheimer et al. recognize a need for beams without this disadvantage. Therefore, it would be obvious to replace the plasma generating means of Manheimer with the plasma generating means of Collins et al. because of the disadvantages noted by Manheimer and the fact that Collins et al. recognize that a uniform plasma can be produced with their means having no magnetic field. (See Collins et al. and Manheimer discussed above)

In response to the argument that the age of the Collins reference prohibits using Collins feature in Manheimer since the problems still exist in the art, it is argued that

Art Unit: 1753

contentions that the reference patents are old are not impressive absent a showing that the art tried and failed to solve the same problem notwithstanding its presumed knowledge of the references. See *In re Wright*, 569 F.2d 1124, 193 USPQ 332 (CCPA 1977).

The obviousness type double patenting rejection is still presented and has been appropriately altered based on Applicant's amended claim.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

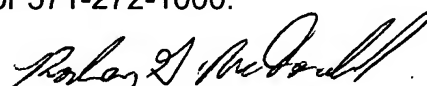
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M- Th with Every other Friday off.

Art Unit: 1753

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Rodney G. McDonald
Primary Examiner
Art Unit 1753

RM
January 4, 2007